

REMARKS/ARGUMENTS

I. Summary of Office Action

In the Office Action dated July 7, 2004, Claims 1-20, 27, and 28 are pending. Claim 1-20, 27, and 28 have been elected for prosecution, and Claims 21-26, which were previously withdrawn, are now cancelled. The drawings are objected to under 37 CFR 1.83(a). In particular, the Examiner has asserted that the terms "second member," "third member," and "adjacent one" must be shown in the drawings. The disclosure is also objected to because of the several informalities. Claims 1-20 and 27-28 are rejected under 35 U.S.C. § 112, second paragraph. Claims 1-3, 8-9, 16, and 27-28 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 3,993,370 to Woollenweber. Claims 4-6, 10-12, and 17-19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Woollenweber in view of design choice. Claims 7, 13, and 20 are rejected under 35 U.S.C. § 102(b) as being anticipated by Woollenweber or under 35 U.S.C. § 103(a) as being obvious over Woollenweber. Claims 7, 13, and 20 are also rejected under 35 U.S.C. § 103(a) as being unpatentable over Woollenweber in view of U.S. Patent No. 6,698,097 to Miura, et al. Claims 14-15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Woollenweber in view of U.S. Patent No. 5,174,733 to Yoshikawa, et al.

New Claims 29-37 are added, as set forth above, and Claim 8 has been corrected.

II. Objections to the Drawings

Applicant first addresses the objections to the drawings and specification. Regarding the objection to the drawings and the use of the claim terms "second member," and "third member," Applicant has amended the specification above to more clearly indicate the terms used in the claims. For example, Claim 1 recites a "shaft mountable member for mounting on a rotatable shaft and adjacent a face of a second member." The first side of the body portion of the shaft mountable member defines grooves that provide a fluid passage so that fluid is communicated "without generating significant thrust loading on the second member." Claim 2 further recites that the second side of the shaft mountable member also defines a plurality of grooves so that fluid is communicated "through the grooves on the second side when the second side is positioned adjacent a third member without generating significant thrust loading on the third

member.” Thus, each of the second and third members are members adjacent the shaft mountable member. For example, as originally described in the specification, “each bearing 50a, 50b can define a generally planar surface, or face 56a, 56b, which is configured to rotate against an adjacent member on the shaft 16 such as the spacer 70, thrust collar 18, or turbine wheel assembly 14.” One such configuration is illustrated in Figure 1, wherein the first bearing 50a is disposed between the spacer 70 and the collar 18, and the second bearing 50b is disposed between the spacer 70 and the turbine wheel assembly 14. Therefore, Applicant submits that both the second member and the third member are illustrated in the drawings.

Nevertheless, Applicant has amended the specification to further reflect the configuration of Figure 1: “The sides 54a, 54b of each bearing 50a, 50b can define a generally planar surface, or face 56a, 56b, which is configured to rotate against an adjacent second or third member on the shaft 16 such as the spacer 70, thrust collar 18, or turbine wheel assembly 14. In other words, as shown in Figure 1, the first side 54a of bearing 50a is configured to rotate against the spacer 70 (i.e., a “second member”) and the second side 54b of bearing 50a is configured to rotate against the thrust collar 18 (i.e., a “third member”). Similarly, as also shown in Figure 1, the first side 54a of bearing 50b is configured to rotate against the spacer 70 (i.e., a “second member”) and the second side 54b of bearing 50b is configured to rotate against the turbine wheel assembly 14 (i.e., a “third member”).” No new matter is added. In fact, the amendment only states what is shown in Figure 1 and previously described in the specification, with particular reference to the terms “second member” and “third member.”

With regard to the objection to the term “adjacent one” recited in Claim 8, Applicant has amended Claim 8 to remove the term. Claim 8 as amended recites a turbocharger that includes a bearing with first and second opposite faces. A compressor defines a face adjacent the first face of the bearing, and a turbine defines a face adjacent the second face of the bearing. “At least one of the faces of the bearing defines a plurality of grooves . . . such that fluid is communicated . . . without generating significant thrust loading on the compressor and turbine. Accordingly, Applicant submits that no amendment to the drawings is required.

III. Objections to the Specification

Regarding the objections to the specification, Applicant has amended the specification at page 6, line 29 to correct the informality as suggested by the Examiner. In addition, Applicant submits that the amendment to the paragraph beginning on page 5, line 19, which is discussed above in connection with the objection to the drawings, addresses the objection to the use of the terms "second member" and "third member" in the claims.

In light of the above amendments and comments, Applicant submits that each of the objections set forth in the Office Action has been addressed and respectfully requests the withdrawal of the objections.

IV. Claim Rejections made under 35 U.S.C. § 112

Turning now to the rejection of claims 1-20 and 27-28 under 35 U.S.C. § 112, second paragraph, Applicant submits that the rejection is addressed by the above amendments and comments. For example, as stated in the Office Action, "the recitation of 'second member' renders the claims indefinite, since it is not clear that, which element(s) is/are referenced to 'second member'. Accordingly, applicant should define or clarify 'second member'." A similar assertion is made regarding the term "third member." As set forth above, the specification describes and illustrates members that are adjacent to opposite faces of the bearings, i.e., the spacer **70**, collar **18**, and wheel assembly **14**. Each of those members can be a "second" or "third" member. Further, Applicant has amended the specification at page 5, lines 19-30 to explicitly refer to the members with the terms "second member" and "third member." Similarly, the Office Action states that "the recitation of 'adjacent one' renders [Claim 8] indefinite, since it is not clear that, which element(s) is/are referenced to be adjacent, such as thrust collar spacer, turbine wheel, compressor wheel, face, or surface." Applicant submits that the deletion of the term from Claim 8 addresses this rejection.

Accordingly, Applicant submits that the claims are not indefinite and respectfully requests that the rejections made under 35 U.S.C. § 112, second paragraph, be withdrawn.

V. Claim Rejections made under 35 U.S.C. § 102/103

Finally, Applicant respectfully traverses each of the rejections made under 35 U.S.C. § 102(b) and 103(a).

Each of the claims is rejected under Woollenweber, alone or in combination with a secondary reference. That is, Claims 1-3, 8-9, 16, and 27-28 are rejected under 35 U.S.C. § 102(b) as being anticipated by Woollenweber. Claims 4-6, 10-12, and 17-19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Woollenweber in view of design choice. Claims 7, 13, and 20 are rejected under 35 U.S.C. § 102(b) as being anticipated by Woollenweber or under 35 U.S.C. § 103(a) as being obvious over Woollenweber. Claims 7, 13, and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Woollenweber in view of U.S. Patent No. 6,698,097 to Miura, et al. Claims 14-15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Woollenweber in view of U.S. Patent No. 5,174,733 to Yoshikawa, et al.

Woollenweber is directed to a “combined journal and thrust bearing” that “provides both radial and longitudinal bearing support” with “a reduced relative speed between the rotating surfaces of the rotor and the mating thrust surfaces on the bearing.” Col. 1, lines 47-61. In particular, “oil under pressure is introduced through passages to the outer-bearing surfaces and provides lubrication for this surface. In addition the oil is carried through the sleeve bearings to feed the thrust surfaces on one or both ends of the sleeve bearing.” Col. 1, line 66 – col. 2, line 3. “In order to provide an adequate oil supply to the thrust surfaces on the ends of the bearing, each bearing preferably includes axial holes extending therethrough and communicating with the radial holes carrying the pressurized oil. Thus, a direct supply of cool oil is introduced to all four thrust surfaces.” Col. 2, lines 6-12. Two such bearings **56, 58** are illustrated in Figure 2, and an end view of the bearing **58** is shown in Figure 4. “A plurality (e.g., six) of radial holes **68** are provided in each bearing **56, 58** to allow oil to pass to the interface between the shaft **22** and the bearings **56, 58**. A plurality (e.g., three) of axial holes **70** are provided in each of the bearings. The holes **70** communicate with certain of the radial holes **68** so as to carry oil under pressure to the four thrust end faces of the bearings **56, 58**. Each end face of the bearings **56, 58** may include three radial grooves **72** of V-shaped cross section having an included angle of approximately 150°. The axial holes **70** communicate with these grooves thereby enabling the

oil to be distributed over the end faces (see FIG. 4).” Col. 4, lines 23-35. Thus, Woollenweber discloses a bearing in which pressurized oil is delivered axially through the axial holes **70** to the thrust end faces, and then through the radial grooves **72**, i.e., radially inward and outward from the ends of the radial holes **70**. Thus, the bearings **56**, **58** are configured to deliver the oil to the thrust end faces of the bearings with an axial velocity, thereby providing a thrust function.

A. Regarding Claims 1-20

The present invention is directed to a shaft mountable member (as well as a turbocharger, shaft, and associated methods) that defines grooves for fluid communication without significant thrust loading. For example, Claim 1 recites a shaft mountable member with a body portion that defines a bore for receiving a shaft and a first side that “defines a plurality of grooves extending radially between the bore and an outer perimeter of the first side.” Thus, the shaft mountable member can be mounted adjacent a face of a second member so that each groove provides “a fluid passage between the bore and the outer perimeter such that fluid is communicated between the bore and the outer perimeter through the grooves without generating significant thrust loading on the second member.”

As set forth above, Woollenweber does not teach such a fluid passage. To the contrary, Woollenweber specifically teaches a “combined journal and thrust bearing” that provides “longitudinal bearing support” via the axial holes **70** that “carry oil under pressure to the four thrust end faces of the bearings **56**, **58**.” Thus, Woollenweber does not describe “a fluid passage between the bore and the outer perimeter such that fluid is communicated between the bore and the outer perimeter.” Instead, each bearing **56**, **58** of Woollenweber is configured to deliver oil from the axial holes **70** to the grooves **72**. Moreover, Woollenweber does not disclose “a fluid passage between the bore and the outer perimeter such that fluid is communicated . . . without generating significant thrust loading on the second member.” In fact, the bearings **56**, **58** are specifically configured to provide thrust, and the flow of the oil through the axial holes **70** does provide thrust loading.

Similarly, independent Claims 8 and 16 include similar limitations. For example, Claim 8 recites a turbocharger that includes a bearing with at least one face that defines “grooves extending radially between the bore and an outer perimeter of the bearing, each of the grooves

providing a fluid passage between the bore and the outer perimeter such that fluid is communicated between the bore and the outer perimeter through the grooves without generating significant thrust loading on the compressor and turbine.” Claim 16 recites an elongate shaft that includes “a shoulder surface extending radially between the outer surfaces of the first and second portions, the shoulder surface defining a plurality of grooves extending radially between the outer surfaces of the first and second portions, each of the grooves providing a radial fluid passage between the shoulder surface and the relatively rotatable member such that fluid is communicated through the grooves without generating significant thrust loading between the shoulder surface and the relatively rotatable member.”

In addition, Claim 16 recites that the shaft comprises the shoulder surface defining the grooves so that the grooves provide a radial fluid passage “between the shoulder surface and the relatively rotatable member.” The Office Action states that “Woollenweber discloses an elongate shaft (26) for receiving a relatively rotatable member (56, 58), the shaft comprising . . . “a shoulder surface extending radially between the outer surface of the first and second portions, the shoulder surface defining a plurality of grooves (68, 72).” Applicant disagrees. The shaft 26 of Woollenweber defines a shoulder, but the shoulder does not define grooves of any kind. In fact, the grooves 72 are defined by the bearings 56, 58. If the bearings 56, 58 were taken to be part of the shaft 26, no relatively rotatable member is provided. (Reference numeral 68 refers to radial holes – not grooves – that are also defined by the bearings 56, 58.)

Thus, Applicant submits that each of Claims 1, 8, and 16 is patentable over Woollenweber. In addition, each of the dependent Claims 2-7, 9-15, 17-20, 29, and 30 is also patentable for the same reasons.

Further, regarding dependent Claims 14 and 15, the Office Action notes that “Woollenweber fails to disclose a spacer being positioned[ed] between the two bearings,” but states that “Yoshikawa teaches that it is conventional in the supercharger art, to utilize a spacer (17) being positioned[ed] between the two bearings (13, 14) (See Figures 1-2).” Applicant respectfully submits that it would not have been obvious to combine the spacer 17 of Yoshikawa, et al. with the bearings 56, 58 of Woollenweber because Woollenweber requires the use of flanges 64, 66 adjacent the bearings 56, 58 which provide “thrust-bearing interfaces.” Col. 4, lines 36-41. In fact, the provision of the thrust bearing interfaces between the bearings 56, 58

and the flanges 64, 66 is cited as an improvement over the structure of Figure 2. *Id.*

Presumably, the provision of the thrust-bearing interface between the bearings 56, 58 and flanges 64, 66 also allowed the elimination of the thrust plate 38 which provides a thrust surface for the bearing in the prior art structure illustrated in Figure 1 of Woollenweber. Col. 3, lines 30-33. The elimination of the thrust plate 38 is specifically cited as an improvement in Woollenweber, and it would not have been obvious to replace the flanges 64, 66 with the spacer of Yoshikawa and/or the thrust plate 38.

B. Regarding Claims 27-28

Claim 27 recites a method for circulating a lubricant between a shaft member on a shaft and an adjacent face of a second member. The method includes providing on the shaft a shaft member defining first and second sides and a bore therebetween for receiving the shaft. The second member is also provided on the shaft adjacent the first side of the shaft member. Further, the method recites “circulating a fluid radially through a plurality of grooves on the first side of the shaft member between the bore and an outer perimeter of the first side such that the fluid is communicated between the bore and the outer perimeter through the grooves without generating significant thrust loading between the shaft member and the second member.” Woollenweber does not disclose circulating fluid radially between the bore and outer perimeter. Instead, as stated above, Woollenweber describes delivering oil through the axial holes 70, and therefrom through the grooves 72. That is, Woollenweber does not disclose that any oil is delivered between the bore and outer perimeter of the bearings 56, 58 as claimed. Further, as noted above, Woollenweber does not disclose circulating the fluid “without generating significant thrust loading” as claimed. Instead, Woollenweber specifically describes the provision of thrusting.

Therefore, Woollenweber does not disclose each of the elements of Claim 27, and Applicant therefore submits that Claim 27 is patentable over Woollenweber, as is Claim 28 that depends therefrom.

C. Regarding new Claims 31-37

New independent Claim 31 recites a shaft mountable member having a body portion that defines a bore therethrough and “one or more radial holes extending from a radially outer surface

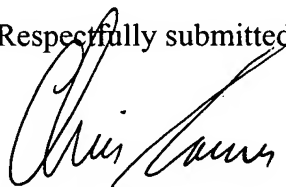
of the body portion to the bore, the body portion being configured such that all fluid supplied into the one or more radial holes is delivered by the holes into the bore." The first side of the body portion also defines a plurality of grooves extending radially between the bore and an outer perimeter of the first side such that fluid is communicated between the bore and the outer perimeter through the grooves. One such shaft mountable member is illustrated in Figures 2 and 3 of the present application. Applicant respectfully submits that neither Woollenweber nor any of the other cited references describes such a configuration. Accordingly, Claim 31 is patentable over the cited references, as is each of Claims 32-37, which are dependent on Claim 31.

* * * *

CONCLUSIONS

In view of the amendments and remarks presented above, Applicant submits that each of the pending Claims 1-20 and 27-37 is patentable over the cited references and therefore the present application is in condition for allowance. As such, the issuance of a Notice of Allowance is respectfully requested. In order to expedite the examination of the present application, the Examiner is encouraged to contact Applicant's undersigned attorney in order to resolve any remaining issues.

Respectfully submitted,



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